

What is claimed is:

1. A cap and vessel positioning system comprising:
  - a threaded cap having a cap flange; and
- 5 a threaded vessel having a vessel flange, wherein the threaded cap is secured to the threaded vessel when the cap flange and vessel flange are aligned.
- 10 2. The positioning system of claim 1 wherein the threaded vessel and thread cap have multiple disjointed threads.
- 15 3. The positioning system of claim 2 wherein the threaded vessel and threaded cap each have four disjointed threads extending about 180 degrees around the circumference of the threaded vessel, further wherein each thread starts in a location about 90 degrees away from an adjacent thread.
4. The positioning system of claim 1 wherein the cap flange and vessel flange each have four sides of about the same length.
- 20 5. The positioning system of claim 4 wherein the cap flange and the vessel flange are substantially square.
- 25 6. The positioning system of claim 4 wherein the threaded vessel and threaded cap each have four disjointed threads extending about 180 degrees around the circumference of the threaded vessel, further wherein each thread starts in a location at the midpoint of one of the vessel flange sides, and about 90 degrees away from an adjacent thread.
7. The positioning system of claim 4 wherein the threaded cap is secured to the threaded vessel a first time after being rotated in one direction approximately 180 degrees.

- Sub 1*
8. The positioning system of claim 4 wherein the threaded cap is secured to the threaded vessel after being rotated in one direction about 360 degrees or less.
9. The positioning system of claim 7 wherein the threaded cap is removed from the threaded vessel after being rotated in an opposing direction 180 degrees, further wherein the threaded cap is resecured to the threaded vessel in substantially the identical position as the first time.
10. The positioning system of claim 9 wherein the threaded cap is lifted from and returned to a locking pocket when not in use on the vessel.
11. The position system of claim 10 wherein the threaded cap is lifted and returned to the locking pocket with a cap rotator.
- Sub 2*
12. The positioning system of claim 1 wherein the threaded cap and threaded vessel are injection molded using polypropylene.
13. A cap and vessel positioning system comprising:  
a locking arm having an opening with a locking device; and  
20 a threaded vessel having a vessel flange, the threaded vessel securable in the locking device.
14. The positioning system of claim 13 wherein the locking device is a pair of partitions or a locking pocket.
- 25 15. The positioning system of claim 13 further comprising a threaded cap having a cap flange, the threaded cap securable to the threaded vessel.
16. The positioning system of claim 13 further comprising a cap rotator with a suction cup.
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17. The positioning system of claim 16 wherein the cap rotator has blades on opposing sides, further wherein the cap is held between the blades.

18. A method for sealing a vessel, comprising the steps of:

5 placing a threaded cap having a cap flange on a threaded vessel having a vessel flange; and

securing the threaded cap to the threaded vessel a first time by rotating the threaded cap in one direction, the threaded cap secured to the threaded vessel when the cap flange and vessel flange are aligned.

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19. The method of claim 18 further comprising the steps of:

removing the threaded cap from the threaded vessel by rotating the threaded cap in an opposing direction; and

resecuring the threaded cap to the threaded vessel in substantially the

15 identical position as the first time.

20. The method of claim 19 wherein the threaded vessel and threaded cap each have multiple disjointed threads.

20 21. The method of claim 20 wherein the threaded cap is secured to the threaded vessel the first time after being rotated in one direction less than about 360 degrees.

22. The method of claim 20 wherein the steps of placing, securing, removing and resecuring are automated, further wherein the cap is secured or resecured to the  
25 vessel by rotating the cap approximately 180 degrees in one direction, the cap removed from the vessel by rotating the cap approximately 180 degrees in the opposite direction.

23. A mixing and pouring apparatus, comprising:

30 a base;

a locking arm support carried on the base;  
a locking arm rotatably mounted within the locking arm support; and  
a drive mechanism operatively coupled to the locking arm, the drive  
mechanism capable of rotating the locking arm.

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24. The apparatus of claim 23, and further comprising a motor operatively connected to the drive mechanism, the motor effecting operation of the drive mechanism to rotate the locking arm.
- 10 25. The apparatus of claim 23, wherein the locking arm further comprises a plurality of vessel openings and a matching plurality of vacuum ports, each of the vessel openings sized to accommodate a vessel, and each of the locking ports capable of retaining the vessel in the locking arm.
- 15 26. The apparatus of claim 25, wherein the locking arm further comprises a plurality of locking pockets, one locking pocket of the plurality of locking pockets surrounding one of the plurality of vessel openings.
- 20 27. The apparatus of claim 26, wherein each locking pocket is substantially square.
28. The apparatus of claim 25, wherein each locking port comprises a locking opening and an O-ring surrounding the locking opening, and wherein the locking opening is connected to a vacuum line for drawing a partial vacuum in the locking opening.
- 25 29. The apparatus of claim 28, wherein the vacuum line is situated internal to the locking arm.

30. The apparatus of claim 23, wherein the locking arm support further comprises a drain trough for receiving waste material from a vessel situated in the locking arm when the locking arm is rotated to pour material from a vessel.

5 31. The apparatus of claim 30, wherein the drain trough includes a drain for draining waste fluid.

32. The apparatus of claim 23, wherein the drive mechanism comprises:  
a motor having a drive shaft, the motor connectable to an external motor  
10 control;  
a drive gear operatively coupled to the drive shaft;  
a free gear operatively, fixedly coupled to the rotatable locking arm; and  
a belt seated over the drive gear and the free gear, and wherein the belt is  
movable to drive the free gear in response to motion of the drive gear.  
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33. The apparatus of claim 32, wherein each of the drive gear and the free gear has a plurality of gear notches, and wherein the belt has a plurality of belt notches, the belt notches and gear notches matching in size.

20 34. The apparatus of claim 23, and further comprising a registration mechanism, the registration mechanism comprising:

a registration disk operatively, fixedly coupled to the free gear, the  
registration disk having a registration slot therein;  
an optocoupler having a transmitter and a receiver separated by a gap,  
25 wherein the registration disk is positioned to extend into the gap; and  
control lines operatively electrically connected to the optocoupler and to the  
motor; and  
wherein the registration slot is aligned in the gap of the optocoupler when the  
registration disk is in a home position wherein the locking arm is in a  
30 substantially vertical position.

35. The apparatus of claim 34, wherein the motor queries the receiver, and drives the drive shaft to rotate the registration disk to its home position.

36. The apparatus of claim 24, wherein the motor further comprises a processor  
5 and a memory, the memory capable of storing a plurality of operating commands for the motor, and the processor capable of executing the stored commands to operate the motor.

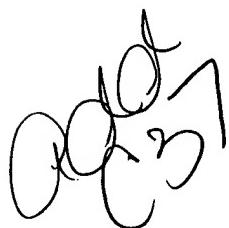
37. The apparatus of claim 23, wherein the base includes a plurality of guide pin  
10 openings, the apparatus further comprising:

a supplemental cradle having a plurality of cradle vessel openings each sized to accomodate a vessel, the supplemental cradle having a plurality of guide pins extending therefore to engage the guide pins with the guide pin openings to position the supplemental cradle on the base.

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38. The apparatus of claim 37, wherein the supplemental cradle further comprises a plurality of locking pockets, each of the locking pockets surrounding one of the plurality of vessel openeings.

20 39. The apparatus of claim 38, wherein each of the locking pockets is substantially square.

A handwritten signature in black ink, appearing to read "J. D. Smith".